

## **FX 300 MS Training guide**

Tools                      FX 300 MS Calculator  
                                  Overhead OH 300 MS

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Handouts                 Applicable activities  
                                  Activities for the Classroom FX-300 Scientific Calculator

Other materials         Quick Reference Guide (inside the calculator cover)

### Key Points/ Overview

- ❖ Two line display
  - ❖ VPAM to show formulas as in textbooks  
(Visually Perfect Algebraic Method)
  - ❖ Fraction key; Mixed number vs. improper fractions
  - ❖ Recall and edit function
  - ❖ Statistics mode including standard deviation and regression
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## **Content**

### BASIC ARITHMETIC CALCULATIONS      Mode 1 (Comp) Computation

Making Corrections During Input  
Replay Function  
Order of Operations  
Display Format (FIX, SCI, Norm)  
Fraction Display  
Decimal-Fraction Conversion  
Angle Display  
Initial Defaults  
Percentage Calculations  
Degrees/Minutes/Seconds  
Memory Calculations  
    Answer Memory  
    Consecutive Calculations  
    Independent Memory  
    Variables  
    Clearing Memory  
Powers/Square Roots/Cube Root, nth roots  
Probability Calculations/Random Number/Factorials  
Trigonometry  
    Trigonometric/Inverse Trigonometric Functions  
    Hyperbolic/ Inverse Hyperbolic Functions  
    Convert Radians to Degrees  
    Coordinate Conversion  
    Logarithms/Natural Logarithms

### STATISTICAL CALCULATIONS

Standard Deviation                      Mode 2 (SD) Standard Deviation  
Regression                                Mode 3 (Reg) Regression

## FX 300 MS Training guide

### Basic Arithmetic Calculations

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#### Making Corrections During Input

- Use the left and right arrows on the REPLAY function to move the cursor to the location you want to correct.
- Press [DEL] to delete at the current cursor position
- Press [SHIFT] [INS] to change the cursor to an insert cursor [ ] .

#### Replay Function

Every time you perform a calculation, the replay function stores the calculation formula and its result in replay memory. Pressing the up arrow displays the formula and result of the calculation you last performed. If you continue to press the up arrow, you will scroll sequentially through your last calculations (most recent to oldest).

Notes:

Replay memory capacity is 128 bytes.

Pressing AC will not clear the replay memory.

If you want to clear the replay memory, press the ON key or reset the modes/settings:

Press [SHIFT] [CLR] [2] [=] or [SHIFT] [CLR] [3] [=] .

#### Order of Operations

The calculator uses “order of operations”.

Examples:  $2 + 3 \times 4 = 14$

$(2 + 3) \times 4 = 20$

$- 2^2 = - 4$

$(- 2)^2 = 4$

You do not need parentheses around  $3 \times 4$ .

Use Replay and [SHIFT] [INS] to add parentheses.

Blinking [ ] is the insert cursor.

#### Display Format

To change the exponential display format, press the [MODE] key 3 times.

Fixed number of decimal places:

Press 1: FIX

You will then be prompted for the number of decimal places (0 – 9).

Scientific Notation:

Press 2: SCI

You will then be prompted for the number of significant digits (0 – 9).

Normal Notation:

Press 3: NORM

You will then be prompted for NORM 1 or NORM 2.

NORM 1 uses exponential notation for integers with more than 10 digits and decimal values with more than 2 decimal places. **Ex/**  $1 \div 1000 = 1 \times 10^{-3}$

NORM 2 uses exponential notation for integers with more than 10 digits and decimal values with more than 9 decimal places. **Ex/**  $1 \div 1000 = .001$

## FX 300 MS Training guide

### Fraction Display

You can use the display set up screen to specify the display format when a fraction calculation result is greater than one. To set the fraction display, press the [MODE] key 4 times and press "1" for Display (DISP).

		<u>Example</u>
Mixed Fraction:	Press 1: a b/c	$\frac{3}{2} + \frac{4}{3} = 2\frac{5}{6}$
Improper Fraction:	Press 2: d/c	$\frac{3}{2} + \frac{4}{3} = \frac{17}{6}$

### Decimal-Fraction Conversion

Examples:

Keystrokes

Enter [2.75] [=]

Press [a b/c]

[SHIFT] [d/c]

Display

2.75

2  $\frac{3}{4}$

11  $\frac{3}{4}$

### Angle Display

To set the angle unit at degrees, radians, or grads, press the [MODE] key 2 times.

Degrees Press 1

Radians Press 2

Grads Press 3

### Initial Defaults

To return the calculation mode and setup to the initial defaults, press [SHIFT] [CLR] [2] [=]. This will return the calculator to the following settings:

Calculation mode	COMP
Angle unit	Deg
Exponential display format	Norm 1
Fraction display format	a b/c
Decimal point character	Dot

### Percentage Calculations

Examples:

	<u>Keystrokes</u>	<u>Display</u>
To find percentage of a number. 12% of 15	[15] [x] [12] [SHIFT] [%]	1.8
To calculate percentage of one number to another. What percentage of 80 is 40?	[40] [÷] [80] [SHIFT] [%]	50

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To add a percentage. 15% to 1000	[1000] [x] [15] [SHIFT] [%] [+]	1150
To discount a percentage. 85 by 10%	[85] [x] [10] [SHIFT] [%] [-]	76.5
% change, when a value is increased. From 30 to 36	[36] [-] [30] [SHIFT] [%]	20

### Degrees/Minutes/Seconds

You can perform calculations using degrees, minutes, and seconds, and convert between sexagesimal and decimal values.

Examples:

<u>Keystrokes</u>	<u>Display</u>
[2.5] [=]	2.5
Press [°,.,,]	2° 30° 0
[10] [°,.,,] [15] [°,.,,] [12] [°,.,,] [x] [4] [=]	41° 0° 48°

### Memory Calculations

There are different types of memory available:  
Answer Memory, Consecutive Calculations, Independent Memory, and Variables.

#### Answer Memory

Whenever you press [=] after inputting values or an expression, the calculated result automatically updates the Answer Memory contents by storing the result. You can recall it by pressing [ANS].

#### Consecutive Calculations

You can use the calculation result that is currently on display (and also stored in Answer Memory) as the first value of your next calculation.

#### Independent Memory

Independent Memory uses the memory area in variable M and is convenient for calculating cumulative totals.

To add a value to M, press [M+].

To subtract a value from M, press [SHIFT] [M-].

To recall the value of M, press [RCL] [M].

#### Variables

There are 9 variables available (including M) to store data (A through F, M, X, and Y).

To add a value to memory letter A, enter the value and press [SHIFT] [STO] [A].

To recall the value of A, press [RCL] [A]. **Note: Do NOT use the ALPHA key.**

#### Clearing Memory

To clear independent memory, press [0] [SHIFT] [STO] [M] (*this stores 0 in M*).

To delete data assigned to a specific variable, press [0] [SHIFT] [STO] <> (enter the letter you want to clear, without pressing the ALPHA key).

To clear the values assigned to all of the variables, press [SHIFT] [CLR] [1] [=].

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### Powers/Square Roots/Cube Root, nth roots

<u>To square a number:</u>	Use the [ $x^2$ ] key Example: [5] [ $x^2$ ] [=] 25
<u>To cube a number:</u>	Use the [ $x^3$ ] key Example: [3] [ $x^3$ ] [=] 27
<u>To raise a number to a power (other than 2 or 3):</u>	Use the [ $\wedge$ ] key Example: [2] [ $\wedge$ ] [4] = 16
<u>To find a square root:</u>	Use the [ $\sqrt{\quad}$ ] key Example: [ $\sqrt{\quad}$ ] [25] [=] 5
<u>To find a cube root:</u>	Use the [ $3\sqrt{\quad}$ ] key Example: [SHIFT] [ $3\sqrt{\quad}$ ] [27] [=] 3
<u>To find a root (other than square or cube root):</u>	Use the [ $x\sqrt{\quad}$ ] key Example: [4] [SHIFT] [ $x\sqrt{\quad}$ ] [81] = 3
<u>To find a reciprocal:</u>	Use the [ $x^{-1}$ ] key Example: [5] [ $x^{-1}$ ] [=] .2 Note: Press [a b/c] and the display will change to 1/5.

### Probability Calculations/ Random Number/ Factorials

Permutations	A permutation is a selection of objects in which the order of the objects matters. Example: To determine the possible number of different arrangements using 4 items selected from 10 items.  [10] [SHIFT] [nPr] [4] [=] 5040
Combinations	A combination is a selection of objects from a collection and order is irrelevant. Example: To determine the number of different combinations of 4 items selected from 10 items  [10] [nCr] [4] [=] 210
Factorials	To calculate a factorial, use [SHIFT] [x!]
Random Number	To generate a random number between 0 and 1, press [SHIFT] [Ran#] [=]

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### Trigonometry

#### Trigonometric/Inverse Trigonometric Functions

You can use sin, cos and tan to calculate and solve trigonometric equations.

Examples (in degree mode):

<u>Keystrokes</u>	<u>Display</u>
[sin] [30] [=]	0.5
[SHIFT] [sin] [.5] [=]	30

#### Hyperbolic/Inverse Hyperbolic Functions

Examples (in degree mode):

<u>Keystrokes</u>	<u>Display</u>
[hyp] [sin] [3.6] [=]	18.28545536
[SHIFT] [hyp] [sin] [30] [=]	4.094622224
Or	
[hyp] [SHIFT] [sin] [30] [=]	

#### Convert Radians to Degrees

To convert Radians to Degrees, put the calculator in Degree mode.

Example:  $\pi$  radians to degrees  
Press [SHIFT] [ $\pi$ ] [SHIFT] [DRG] and press [2] for Radians [=] 180

To convert Degrees to Radians, put the calculator in Radian mode.

Example: 180 degrees to radians  
Press [180] [SHIFT] [DRG] and press [1] for Degrees [=] 3.141592654

#### Coordinate Conversion

You can convert from polar to rectangular and from rectangular to polar. The calculation results are automatically assigned to variables E and F. Note: For both examples, be sure you are in degree mode.

To convert polar coordinates (r,  $\theta$ ) to rectangular coordinates (x, y).

Example: To convert ( r = 2,  $\theta$  = 60) to rectangular coordinates:  
Press [SHIFT] [REC] [2] [ , ] [60] [ ) ] [=] 1 (x value)  
[RCL] [F] 1.732050808 (y value)

To convert rectangular coordinates (x, y) to polar coordinates (r,  $\theta$ ).

Example: To convert ( x = 1, y =  $\sqrt{3}$  ) to rectangular coordinates:  
Press [POL] [1] [ , ] [ $\sqrt{\quad}$ ] [3] [ ) ] [=] 2 (r value)  
[RCL] [F] 60 ( $\theta$  value)

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### Logarithms/Natural Logarithms

You can find logarithms, natural logarithms, and antilogarithms.

Examples:

Keystrokes

[log] [100] [=]

[ln] [90] [=]

[ln] [ALPHA] [e]

[SHIFT] [e<sup>x</sup>] [1] [=]

[SHIFT] [10<sup>x</sup>] [2] [=]

Display

2

4.49980967

1

2.718281828

100

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### Standard Deviation

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Use the [MODE] key to enter the Standard Deviation (SD) mode when you want to perform statistical calculations using standard deviation. [MODE] [2]

- To clear statistical memory, press [SHIFT] [CLR] [1] [=].
- To enter data, use the following key sequence: <value> [DT]
- Input data is used to calculate the following values:

Sum of the squares ( $\sum x^2$ )	[SHIFT] [S-SUM] [1]
Sum of data ( $\sum x$ )	[SHIFT] [S-SUM] [2]
Number of data items (n)	[SHIFT] [S-SUM] [3]
Mean of the data	[SHIFT] [S-VAR] [1]
Population standard deviation $\sigma_n$	[SHIFT] [S-VAR] [2]
Sample standard deviation $\sigma_{n-1}$	[SHIFT] [S-VAR] [3]

#### Key points to note:

- [DT] [DT] inputs the same data twice
- You can input multiple entries of the same data using [SHIFT] [;].  
To input 100 ten times, press [100] [SHIFT] [;] [10] [DT]
- You can scroll through the data you entered using the up and down arrows on the REPLAY button.
- You can edit the displayed data by inputting a new value and then pressing the [=] key to replace it. If you use the [DT] key (and not the [=] key), this will register the value you input as a new data item and will leave the old value as is.
- If you want to perform statistical calculations, always press the [AC] key first to exit the data display.
- To delete a data value that is displayed, press [SHIFT] [CL].
- If you switch to another MODE, you will no longer be able to display or edit your data.



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### Regression

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Use the [MODE] key to enter the Regression (REG) mode when you want to perform statistical calculations using regression. [MODE] [3]

When you enter Regression mode, you can select from 6 types of regression:

Linear regression	[1] (Lin)
Logarithmic regression	[2] (Log)
Exponential regression	[3] (Exp)
Power regression	→ [1] (Pwr)
Inverse regression	→ [2] (Inv)
Quadratic regression	→ [3] (Quad)

- To clear statistical memory, press [SHIFT] [CLR] [1] [=].
- To enter data, use the following key sequence: <x data> , <y data> [DT]
- The values produced by a regression calculation depend on the values input. Results can be recalled using the following:

$\sum x^2$	[SHIFT] [S-SUM] [1]
$\sum x$	[SHIFT] [S-SUM] [2]
n	[SHIFT] [S-SUM] [3]
$\sum y^2$	[SHIFT] [S-SUM] → [1]
$\sum y$	[SHIFT] [S-SUM] → [2]
$\sum xy$	[SHIFT] [S-SUM] → [3]
Mean of the x data	[SHIFT] [S-VAR] [1]
Population standard deviation (x)	[SHIFT] [S-VAR] [2]
Sample standard deviation (x)	[SHIFT] [S-VAR] [3]
Mean of the y data	[SHIFT] [S-VAR] → [1]
Population standard deviation (y)	[SHIFT] [S-VAR] → [2]
Sample standard deviation (y)	[SHIFT] [S-VAR] → [3]
Regression coefficient A	[SHIFT] [S-VAR] → → [1]
Regression coefficient B	[SHIFT] [S-VAR] → → [2]

For regression calculations other than quadratic regression:

Correlation coefficient r	[SHIFT] [S-VAR] → → [3]
Estimate x	[SHIFT] [S-VAR] → → → [1]
Estimate y	[SHIFT] [S-VAR] → → → [2]

For quadratic regression:

$\sum x^3$	[SHIFT] [S-SUM] → → [1]
$\sum x^2 y$	[SHIFT] [S-SUM] → → [2]
$\sum x^4$	[SHIFT] [S-SUM] → → [3]
Regression coefficient C	[SHIFT] [S-VAR] → → [3]
Estimate $x_1$	[SHIFT] [S-VAR] → → → [1]
Estimate $x_2$	[SHIFT] [S-VAR] → → → [2]
Estimate y	[SHIFT] [S-VAR] → → → [3]